Scientific report on Short Visit Grant

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During the short visit that I did to the group of Professor Henk T. C. Stoof at University of Utrecht (November 24th-26th, 2004), I had the opportunity to discuss with Prof. Stoof and his collaborators and the different work lines they are following, as well as tell them what we are studying in my group in Barcelona.

First I talked to the various PhD students of the group on their work on Feshbach resonances in ultracold gases both in the BCS-BEC crossover regime (G. Falco) and in optical lattices (D. Dickerscheid). I could also discuss with Dr. M. Haque on his recent work on the crossing *from* the BEC *to* the BCS side of a Feshbach ressonance, which is rather an interesting subject usually not addressed in theoretical studies.

Finally, I could also discuss with Prof. Stoof and Dr. N. Proukakis. I gave a seminar on our present work on spinor condensates (in collaboration with the group of Prof. Lewenstein from Hannover). Thereafter, we had a long and fruitful discussion on implementing temperature effects in ultracold gases, a subject on which the group of Prof. Stoof has made several contributions (see, e.g., HTC Stoof, JLTP 114:11-108 (1999), U. Al Khawaja et al, PRA 66:013615 (2002), and PRA 68:043603 (2003)), and which has not yet been done on spinor condensates. (We are attempting to do so in our collaboration with the Hannover group but in an approximate way.)

We agreeded that a collaboration on studying temperature effects on the structure and dynamics of multicomponent condensates such as those experimentally studied by the group of Eric Cornell at JILA (see, e.g., J. M. McGuirk et al, PRL 89:090402 (2002) and PRL 91:150402 (2003)) would be very interesting. We plan to start this collaboration shortly, when Dr. Proukakis has had time to settle after his recent transfer from the University of Durham.

Jordi Mur-Petit

Barcelona, December 21st, 2004